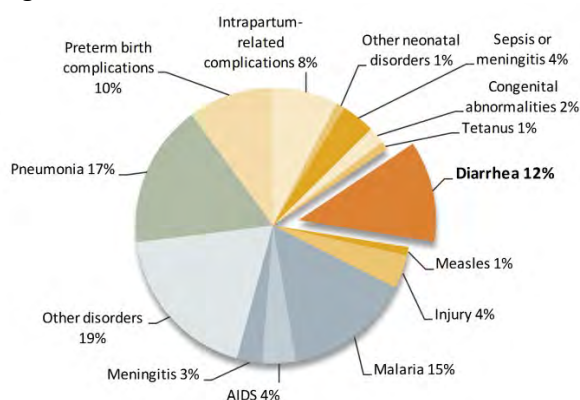


Rotavirus disease and vaccines in Africa

Diarrhea is a leading killer of children across Africa, causing approximately 12 percent of deaths in children under five years of age.¹ Rotavirus, the most common cause of severe and fatal diarrhea in young children worldwide, takes the lives of 232,000 African children under five each year— more than 600 each day.² Studies in Africa show that rotavirus vaccines are safe and effective against severe rotavirus disease and are a cost-effective intervention.²⁻⁵

The high burden of rotavirus disease in African children, coupled with the power of rotavirus vaccines to prevent childhood deaths and hospitalizations, underscores the incredible potential for the introduction of rotavirus vaccines in African countries to save children's lives.

Causes of death in African children under five years of age, 2010¹



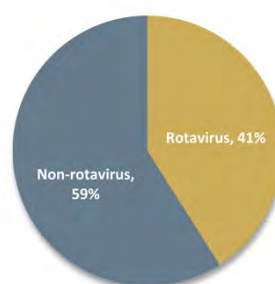
ROTA VIRUS IS THE LEADING CAUSE OF SEVERE AND FATAL DIARRHEA IN AFRICAN CHILDREN <5 YEARS OLD

Rotavirus is a virus that causes gastroenteritis—an inflammation of the stomach and intestines. If left untreated, it can lead to severe dehydration and death. Children six months to two years of age are most vulnerable to infection.

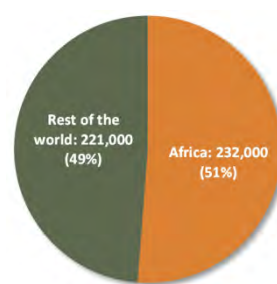
Globally, rotavirus causes more than 450,000 deaths each year in children under five and is responsible for millions of hospitalizations and clinic visits.^{2,6} Nearly a quarter of a million African children die from the deadly, dehydrating diarrhea caused by rotavirus infection every year, accounting for more than 50 percent of the global total.^{2,7} The vast majority of countries worldwide with the highest infant death rates from rotavirus (i.e., rotavirus child mortality rates are greater than 300 deaths per 100,000) are in sub-Saharan Africa.^{2,7}

The World Health Organization (WHO) estimates that 41% of African children hospitalized with acute diarrheal illness are infected with rotavirus.⁸

Diarrhea hospitalizations in Africa⁸



Global deaths from rotavirus disease²



ROTA VIRUS TREATMENT AND PREVENTION STRATEGIES

Rotavirus is highly contagious and spreads easily from person-to-person through contaminated hands and objects. It cannot be treated with antibiotics or other drugs. Mild rotavirus infections can be treated effectively in the same manner as other forms of diarrhea, by providing fluids and salts (oral rehydration therapy). However, children with severe rotavirus diarrhea can become dehydrated and often need intravenous fluids or they risk dying. In developing countries, this type of urgent health care is often inaccessible or unavailable, making rotavirus prevention through vaccination critical to saving children's lives.

Vaccination offers the best hope for preventing severe rotavirus disease and the deadly dehydrating diarrhea that it causes. Improvements in water quality, hygiene, and sanitation stop bacteria and parasites that cause other forms of diarrhea but do not adequately prevent the transmission of rotavirus. Lifesaving rotavirus vaccines should be introduced as part of a comprehensive approach to control diarrheal disease, along with other interventions, including oral rehydration therapy, breastfeeding, zinc treatment, and improvements in water and sanitation.

TWO SAFE AND EFFECTIVE ROTA VIRUS VACCINES ARE SAVING LIVES TODAY

There are two orally administered rotavirus vaccines available today: Rotarix[®], manufactured by GlaxoSmithKline, and RotaTeq[®], manufactured by Merck & Co. Inc. Both vaccines have been shown to be safe and effective in large-scale clinical trials in Africa, Asia,

Europe, Latin America, and the US. Clinical trials in Africa (Ghana, Kenya, Malawi, Mali, and South Africa) found that rotavirus vaccines reduced severe rotavirus disease by more than 60 percent during the first year of life, when children are at greatest risk for severe rotavirus diarrhea.^{3,4}

In June 2009, based in large part on the clinical trials in Africa that demonstrated vaccine efficacy in impoverished, high-mortality settings, the WHO's Strategic Advisory Group of Experts recommended that rotavirus vaccines be included in all countries' national immunization programs.⁹

Rotavirus vaccines are saving lives and improving health in countries where children have access to them. Swift and significant declines in hospitalization and deaths due to rotavirus and all-cause diarrhea have been observed in many of the countries that have introduced rotavirus vaccines into their national immunization programs.¹⁰ Researchers also have found that use of rotavirus vaccines may protect unvaccinated children and adults by reducing transmission (an effect called herd immunity).¹¹

ROTAVIRUS VACCINES IN AFRICA

As of August 1, 2012, 38 countries have introduced rotavirus vaccines in their national immunization programs, including five in Africa: Ghana, Morocco, Rwanda, South Africa, and Sudan. In January 2012, Zambia introduced rotavirus vaccines in Lusaka Province as part of a pilot project called the Programme for Awareness and Elimination of Diarrhoea, which provides comprehensive diarrheal disease prevention and treatment strategies.

Sudan was the first African country to introduce rotavirus vaccines with GAVI Alliance funding in July 2011—just two years after the WHO recommended all countries introduce the vaccine into their national immunization programs. Ghana and Rwanda followed Sudan this year. GAVI has approved 16 additional African countries for rotavirus vaccine support including: Angola, Burundi, Cameroon, Central Africa Republic, Republic of the Congo, Djibouti, Ethiopia, Guinea-Bissau, Madagascar, Malawi, Niger, Sierra Leone, Tanzania, Togo, Zambia, and Zimbabwe.

ROTAVIRUS VACCINES ARE COST-EFFECTIVE AND A WISE INVESTMENT

Rotavirus vaccines are cost-effective, and in GAVI-eligible countries, where 95 percent of deaths due to rotavirus occur, more than 2.4 million child deaths can be prevented by 2030 by

accelerating access to lifesaving rotavirus vaccines.⁵ If used in all GAVI-eligible countries, rotavirus vaccines could prevent an estimated 180,000 deaths and avert 6 million clinic and hospital visits each year, thereby saving US\$68 million annually in treatment costs.⁵

Rotavirus vaccines are an essential and lifesaving intervention in comprehensive diarrhea-control strategies. Adding rotavirus vaccines to national immunization programs and integrating them with appropriate diarrheal disease control interventions as part of a package of strategies to prevent diarrheal disease-related deaths will facilitate achievement of Millennium Development Goal 4—reduction of child mortality.

Accelerating access to rotavirus vaccines will not only save the lives of African children but also lessen the tremendous economic and health burden of rotavirus disease, thereby contributing to poverty reduction and a growing economy. GAVI plans to vaccinate more than 50 million children in at least 40 of the world's poorest countries by 2015.

For more information on rotavirus disease and vaccines please visit <http://rotavirusvaccine.org>.

¹Liu L, Johnson HL, Cousens S, et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *The Lancet*. 2012;379(9832):2151–2161. [N.B. The Africa pie chart does not include all countries on the African continent. For example, two countries with high death rates from rotavirus diarrhea, Djibouti and Sudan, are included in WHO's Eastern Mediterranean region. Please see the appendix to this article for a complete listing of all countries and regions.]

²Tate JE, Burton AH, Boschi-Pinto C, et al. 2008 estimate of worldwide rotavirus-associated mortality in children younger than 5 years before the introduction of universal rotavirus vaccination programmes: a systematic review and meta-analysis. *The Lancet Infectious Diseases*. 2012;12(2):136–141.

³Armah GE, Sow SO, Breiman RF, et al. Efficacy of pentavalent rotavirus vaccine against severe rotavirus gastroenteritis in infants in developing countries in sub-Saharan Africa: a randomised, double-blind, placebo-controlled trial. *The Lancet*. 2010;376(9741):606–614.

⁴Madhi SA, Cunliffe NA, Steele D, et al. Effect of human rotavirus vaccine on severe diarrhoea in African infants. *New England Journal of Medicine*. 2010;362(4):289–298.

⁵Atherly DE, Lewis KDC, Tate J, Parashar UD, Rheingans, RD. Projected health and economic impact of rotavirus vaccination in GAVI-eligible countries: 2011–2030. *Vaccine*. 2012;30(Suppl 1):A7–A14.

⁶Parashar UD, Hummelman EG, Bresee JS, Miller MA, Glass RI. Global illness and deaths caused by rotavirus disease in children. *Emerging Infectious Diseases*. 2003;9:565–572.

⁷World Health Organization. 2008 rotavirus deaths, under 5 years of age, as of 31 January 2012. Available at: www.who.int/entity/immunization_monitoring/burden/ChildRota2008.xls. Accessed January 31, 2012.

⁸Rotavirus surveillance worldwide—2009. *Weekly Epidemiological Record*. 2011;86(18):174–176.

⁹World Health Organization. Meeting of the immunization Strategic Advisory Group of Experts, April 2009—conclusions and recommendations. *Weekly Epidemiological Record*. 2009;84(23):220–236.

¹⁰Patel M, Steele AD, Gentsch JR, Wecker J, Glass RI, Parashar UD. Real-world impact of rotavirus vaccination. *Pediatric Infectious Disease Journal*. 2011;30(1 Suppl):S1–S34.

¹¹Lopman BA, Curns AT, Yen C, Parashar UD. Infant rotavirus vaccination may provide indirect protection to older children and adults in the United States. *Journal of Infectious Diseases*. 2011;204:980–986.



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